



Cummins Flood Risk Reduction Columbus, IN

Operation Stay
Afloat Conference

Presented by:
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March 13, 2014

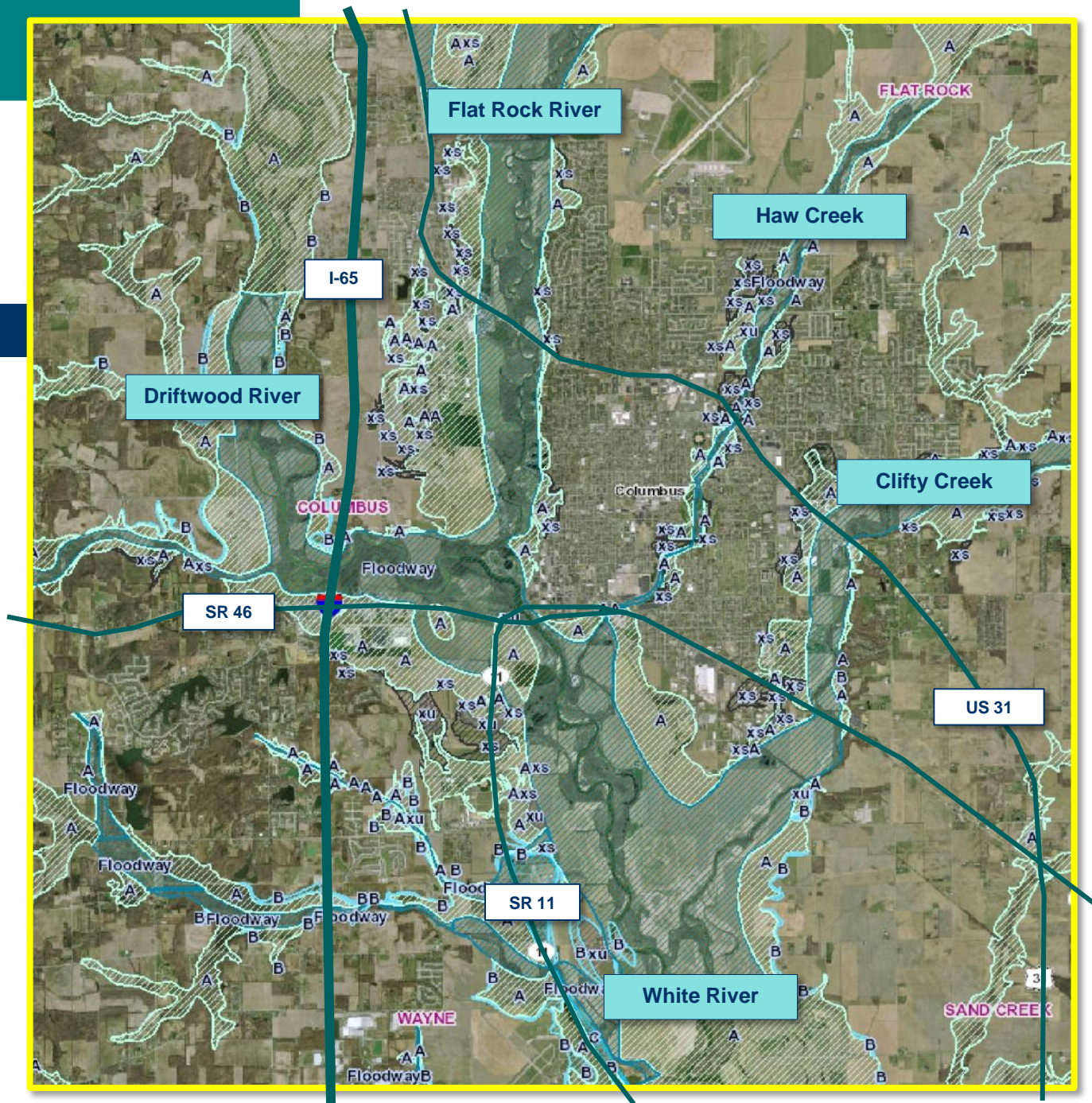


Overview

- Columbus and Cummins
- June 2008 Flood
- Columbus Flood Mitigation
- Cummins Flood Risk Reduction
- Lessons Learned

Columbus, Indiana





Cummins Inc.



May 2008 Floodplain Philosophy

- Floodways are to be avoided
- Flood fringe areas key to growth
- Floodplain regulations are a nuisance so stick to minimum IDNR/FEMA requirements
- “Its never flooded here before! Why do I need flood insurance?”

Haw Creek
Floodplain

US 31

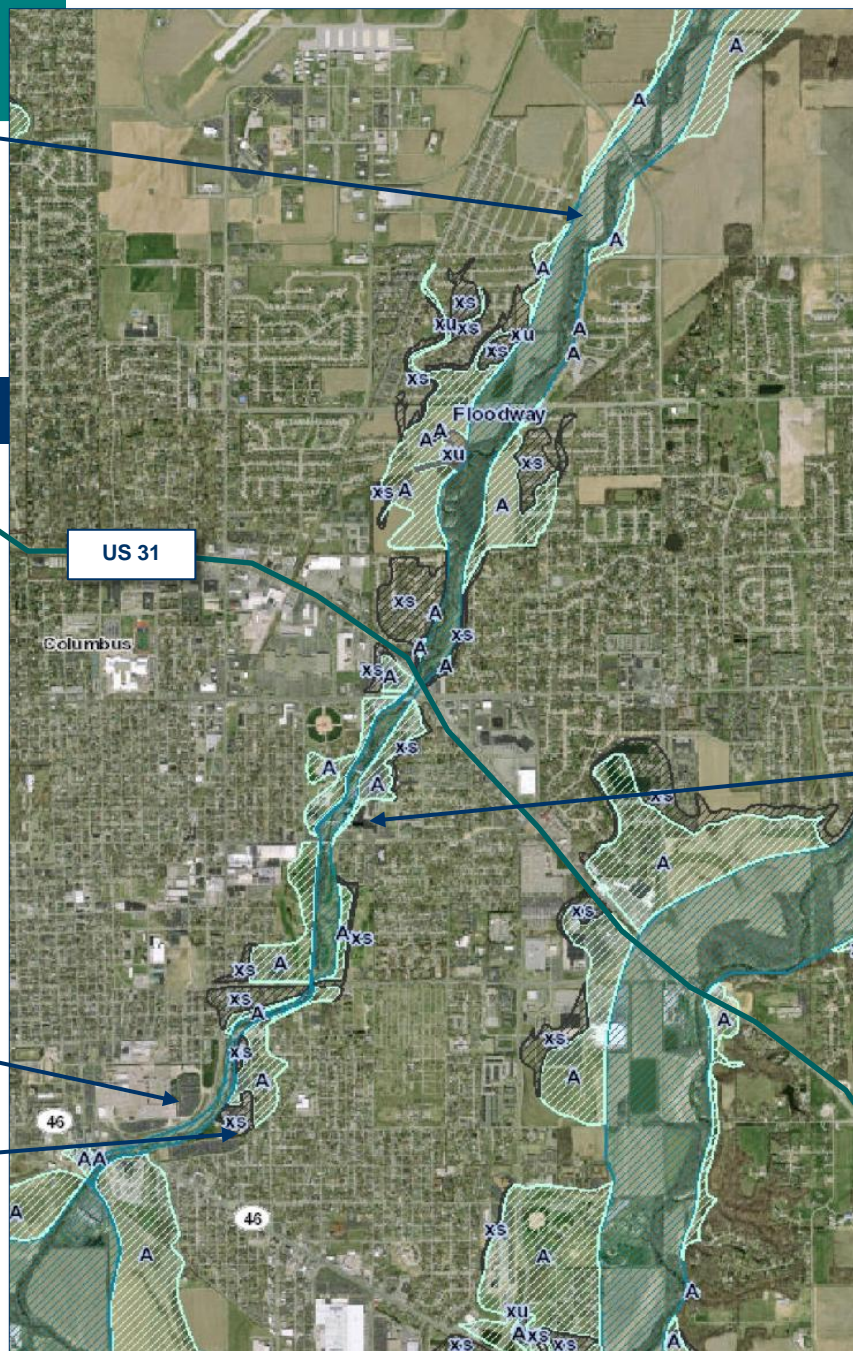
Columbus

Floodway

Columbus Regional
Hospital

Cummins Engine
Plant 1 (CEP)

Cummins Tech
Center (CTC)



Cummins Sites on Haw Creek



Columbus Engine Plant No. 1 (CEP)



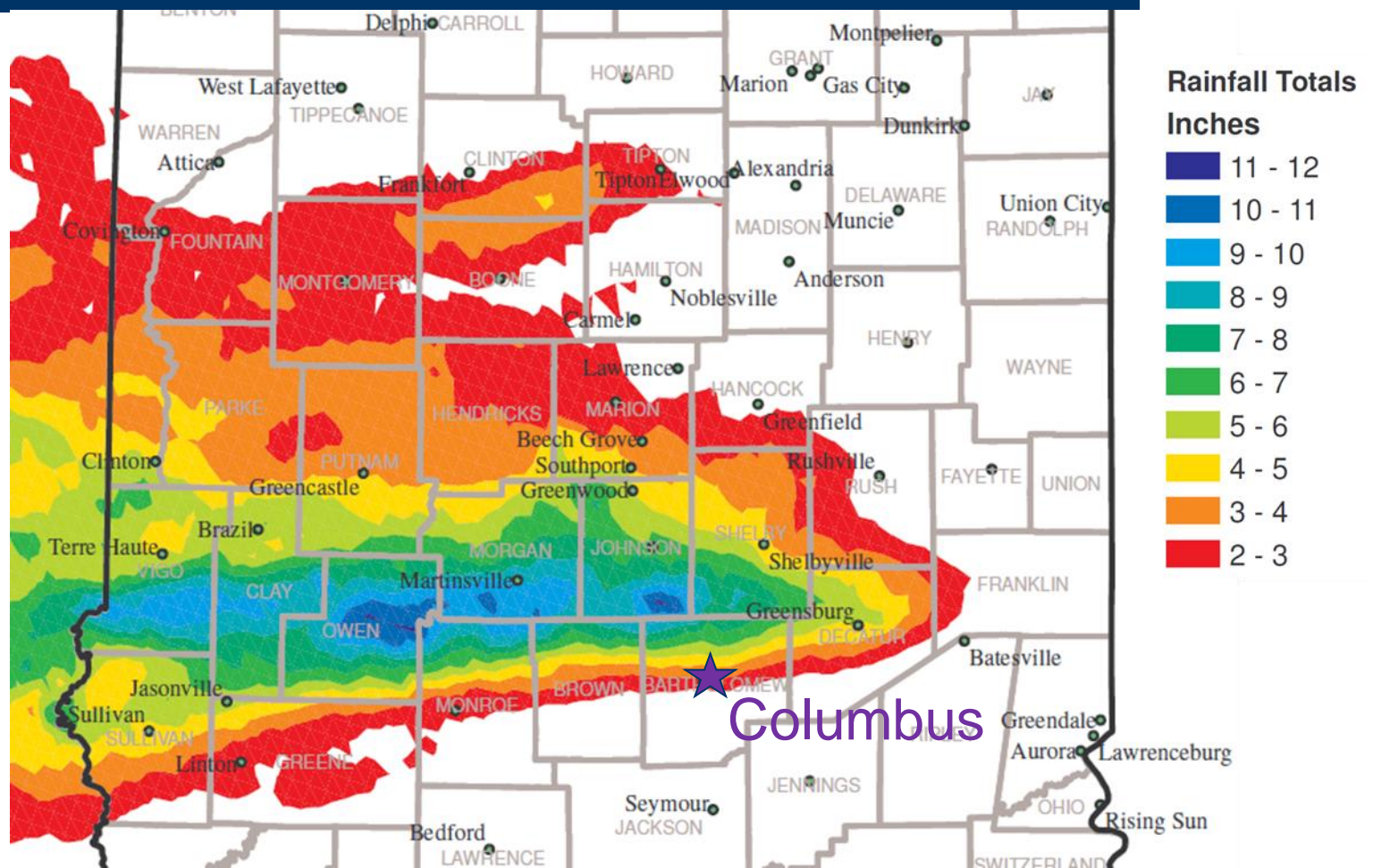
Cummins Tech Center (CTC)



Columbus Regional Hospital



June 2008 Flooding



June 2008 Flooding

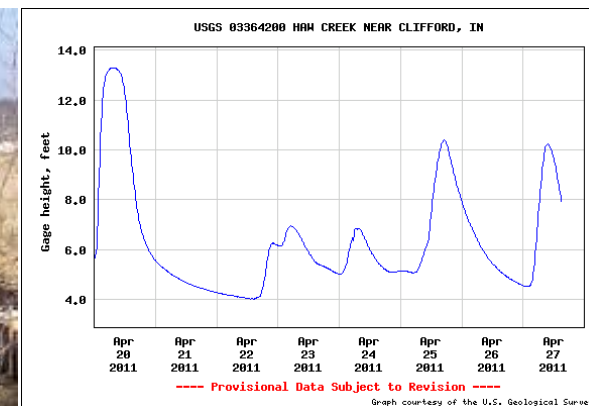
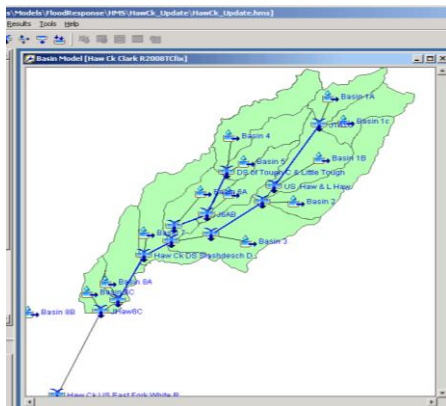


June 2008 Flooding

- 3 deaths attributed to flooding
- +/- 3,000 homes damaged or destroyed
- +/- \$500million in property damage
- Damaged structures include:
 - Columbus Regional Hospital
 - Cummins CTC, CEP, CDC, and COHA
 - Columbus East High School
 - Bartholomew County REMC Offices/Shop

Haw Creek Flood Risk Mitigation Study Scope

- What is the extent of the flood risk along Haw Creek?
- What can be done to reduce the flood risk?
- How can we prepare for floods and reduce damages?
- How do we prevent the flooding from becoming worse?



Haw Creek Flood Risk Mitigation Study Outcomes

- Detailed unsteady, quasi 2D, modeling of Haw Creek
- Recommended flood reduction measures
 - Clear Debris and Woody Vegetation
 - Conduct voluntary buyout program
 - Encourage individual site flood protection (with NAI!)
- Improve warning and response tools
 - USGS to improve flood gages and prediction
 - City hires CBBEL to complete Flood Response Plan
- Enact strict NAI regulation

Haw Creek Regulations (2011 and Beyond)

- New floodplain maps to supplement FIRM maps
- Requires projects on Haw Creek to be evaluated with a detailed unsteady-state model
- Maximum cumulative allowable increase in 500-year flood elev. = 0.1 feet



Cummins Flood Risk Reduction Project Schedules

- Feasibility Study of Cummins Sites (2010-2011)
- Preliminary Engineering Reports (PER) at 4 Facilities
Began May 2011 and Completed August 2011 – January 2012
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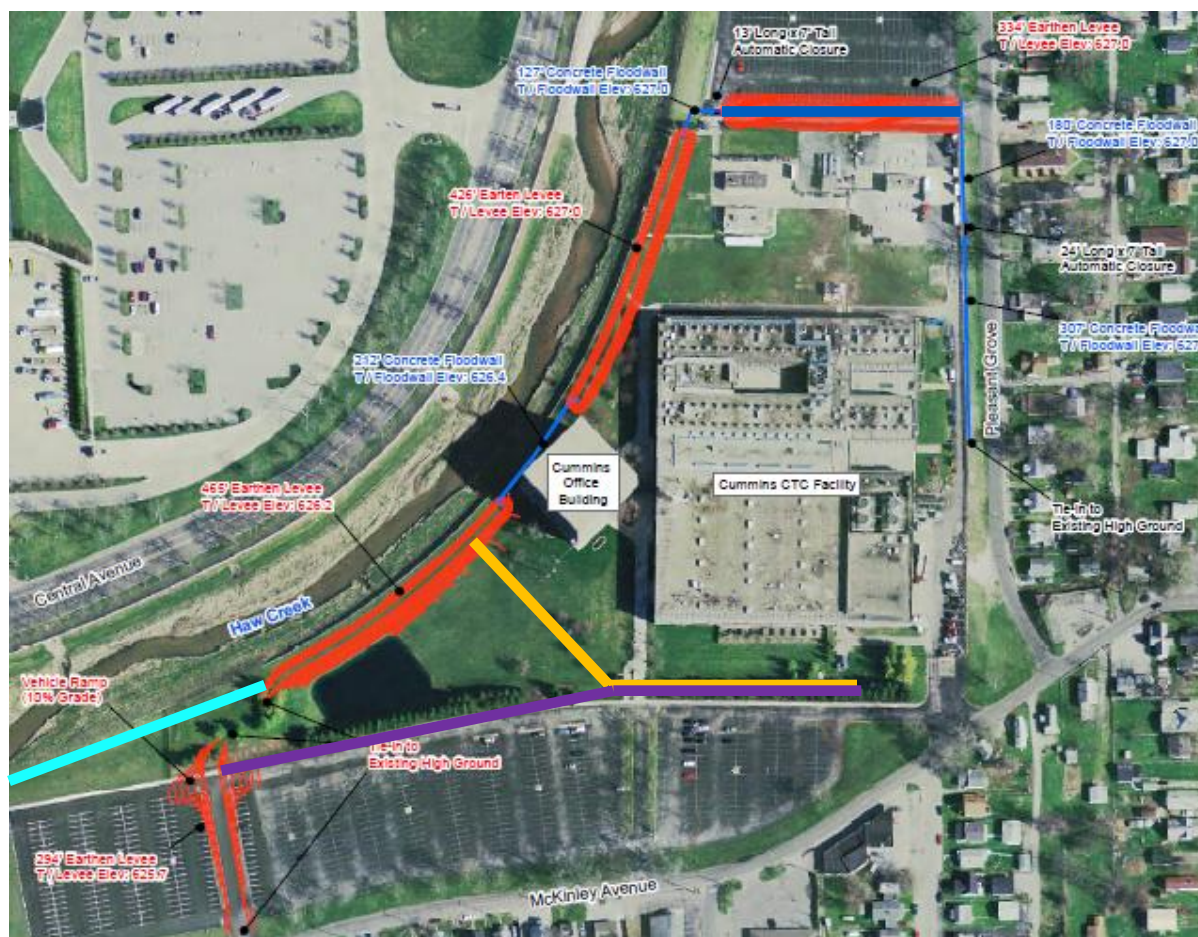
Preliminary Engineering Reports

- Prepared for all 4 facilities along Haw Creek
- Geotechnical Investigation
- Hydrogeologic Analysis
- Hydraulic Analysis
- Typical Levee and Floodwall Details
- Alignment Alternatives
- Utility Considerations
- Seepage and Interior Drainage
- Access and closures
- Cost Estimates

Project Objectives

- Prioritize sites that need protection
- Minimize loss of floodplain storage
- Provide “June 2008” flood protection (with appropriate freeboard considerations)
- Provide automated closures for access
- Consideration for underground utilities
- Provide seepage collection and pumping system
- Design consistent with FEMA/USACE guidance

Minimize Loss of Floodplain Storage CTC Alignments



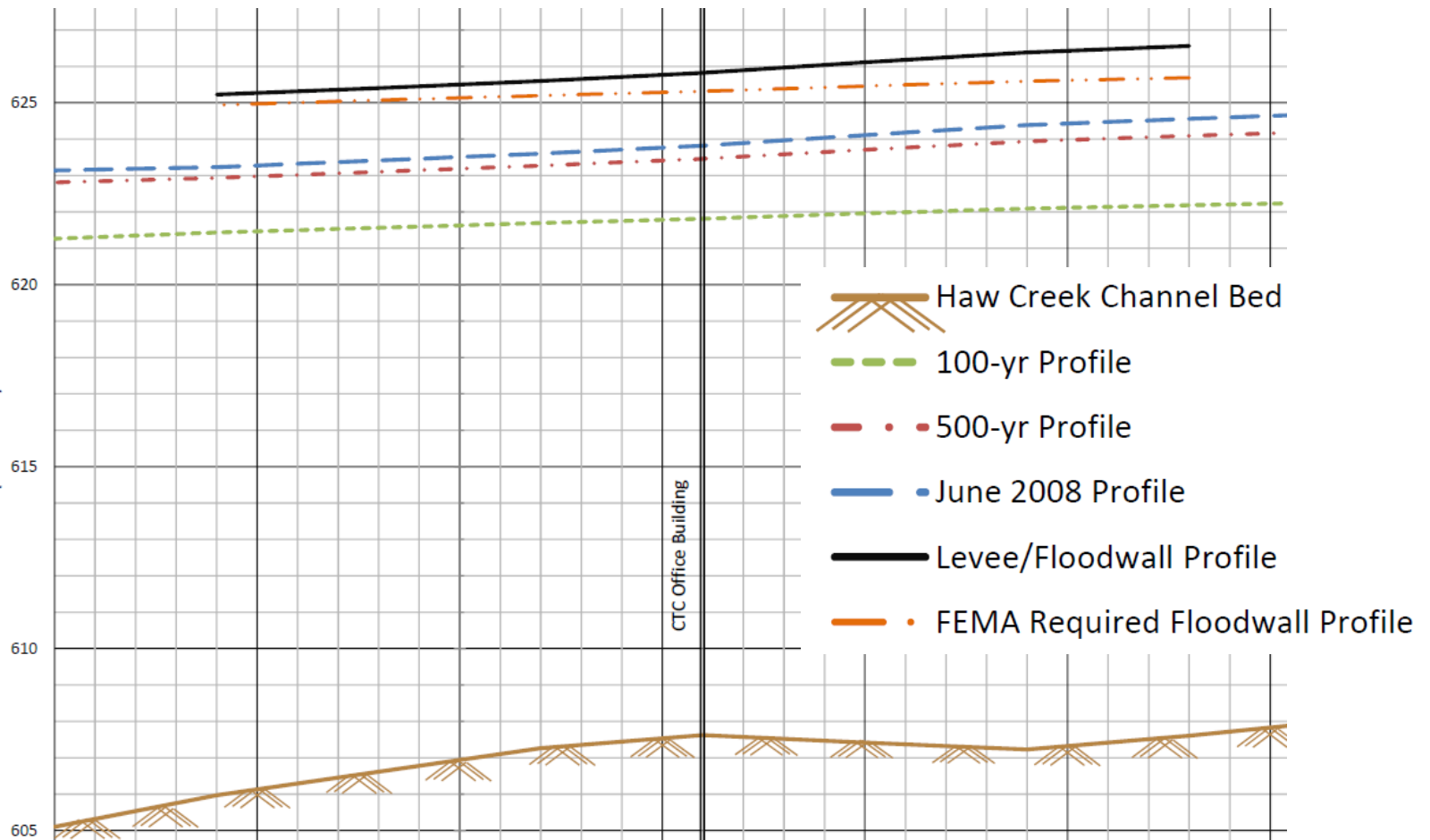
Minimize Loss of Floodplain Storage CEP Alignment



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Provide “June 2008” flood protection Haw Creek Flood Profile

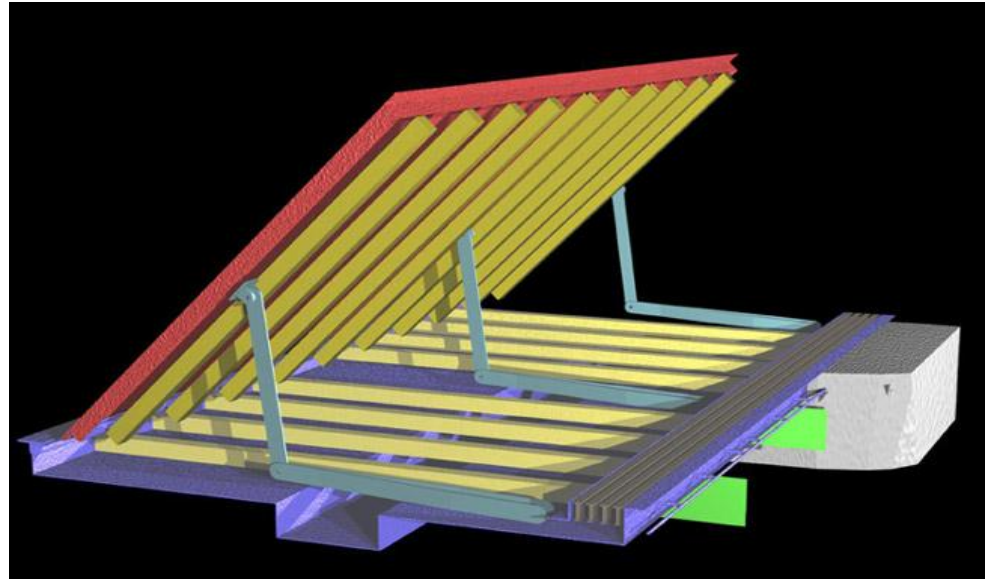


Project Objectives

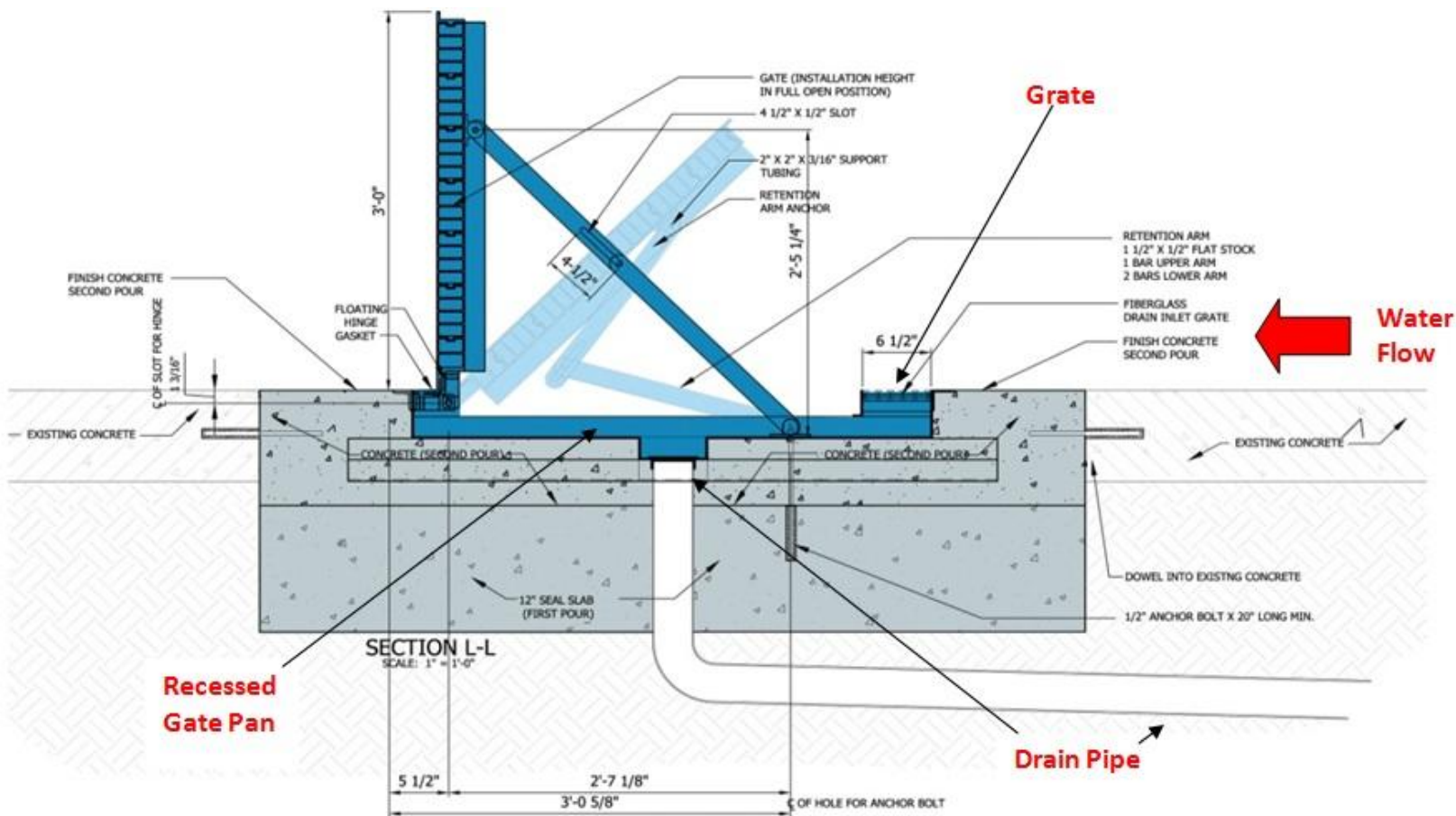
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Floodwall Closure Gates

- FloodBreak gates selected for closures
- Fully automatic, passive system
 - (no people, no power to operate)
- Lies flat when not in use and then floats into open position automatically
- Capable of supporting vehicle loads
- www.floodbreak.com



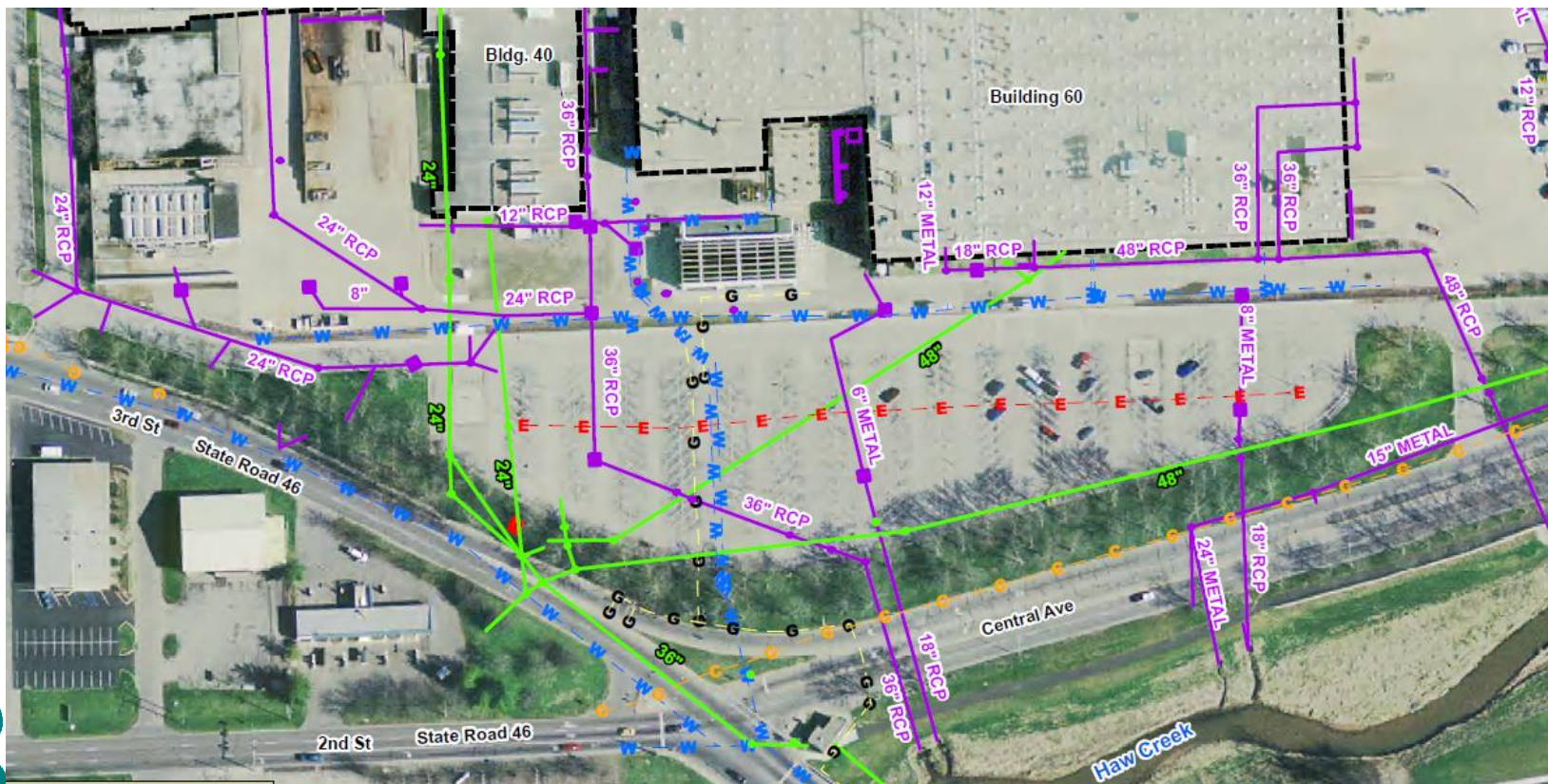
Floodwall Closure Gates



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Consideration for Underground Utilities



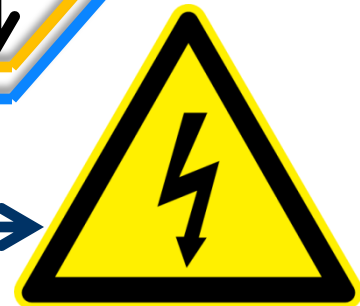
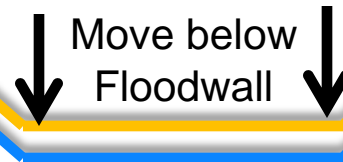
Consideration for Underground Utilities

- All storm and Sanitary

- Storm and Sanitary > 24"

- Water and Gas

- Fiber-optic and Power



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Seepage Collection and Pumping

Problem:

- Sandy Soils = Seepage under Floodwall
- Coincident rainfall + Closed flap gates = Flooding
- Solution = Pumping + Retention
 - Convert irrigation pond to retention
 - Two pump stations at CTC
 - Two dewatering wells at CTC
 - One pump station at CEP



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Design with FEMA/USACE guidance

- Code of Federal Regulations
 - Title 44, Section 65.10. October 1, 2009.
- Design and Construction of Levees.
 - USACE Engineer Manual 1110-2-1913; April 30, 2000.
- Engineering Design: Retaining and Flood Walls
 - USACE Engineer Manual 1110-2-2502; September 29, 1989.
- Hydrologic Analysis of Interior Areas
 - USACE Engineer Manual 1110-2-1413; January 15, 1987.
- Structural Design of Closure Structures for Local Flood Protection Projects
 - USACE Engineer Manual 1110-2-2705; March 31, 1994.

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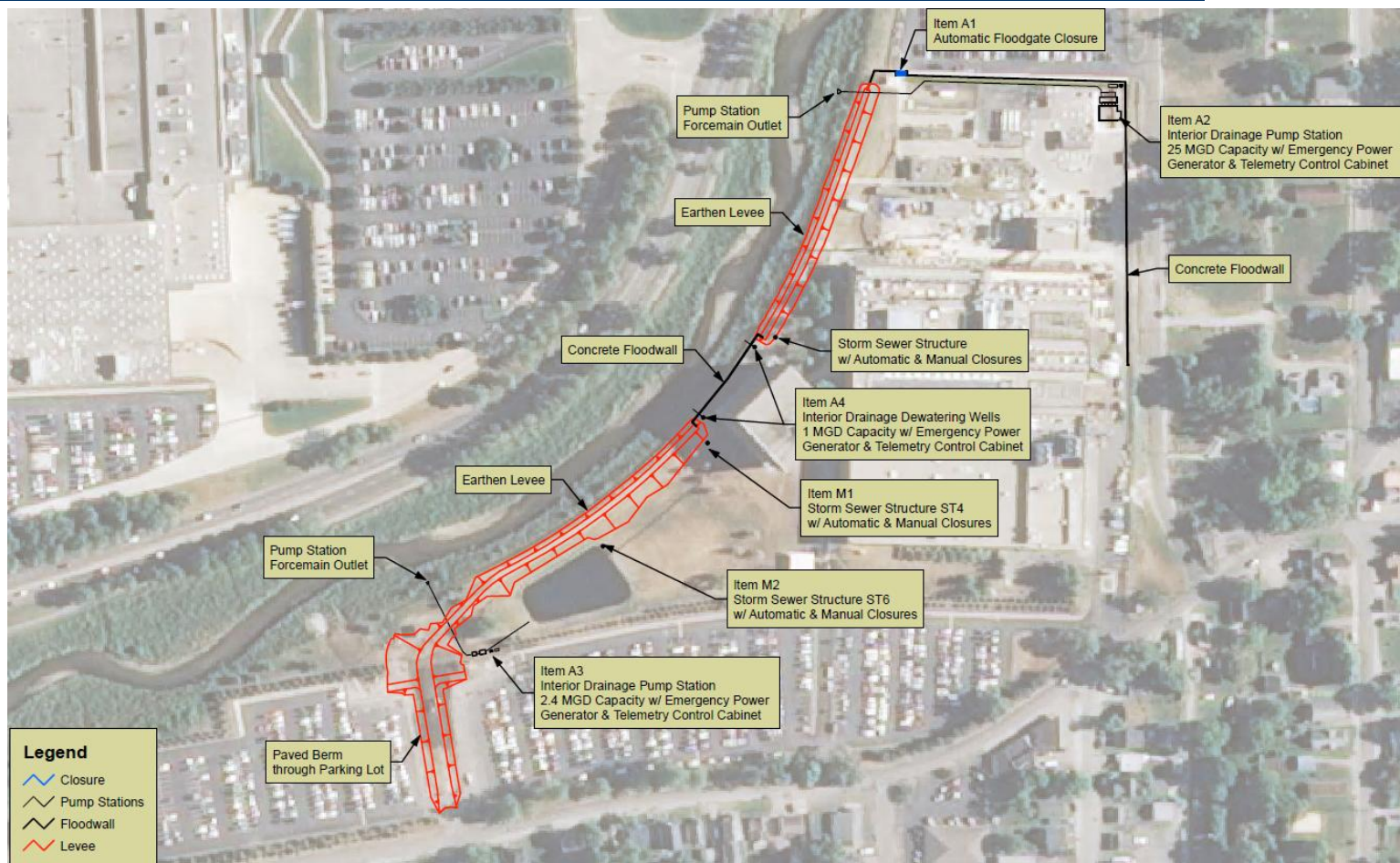
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CTC Site Design Overview

- Approx. 1,200 feet of earthen levee
- Approx. 1,100 feet of concrete floodwall
- 1 automatic closure gates
- Pump Station 1 – 19,500 GPM capacity w/ 5 pumps
- Pump Station 2 – 1,700 GPM capacity w/ 2 pumps
- Dewatering wells – 2,900 GPM capacity w/ 2 pumps
- Architectural/landscape considerations important

CTC Site Design Overview



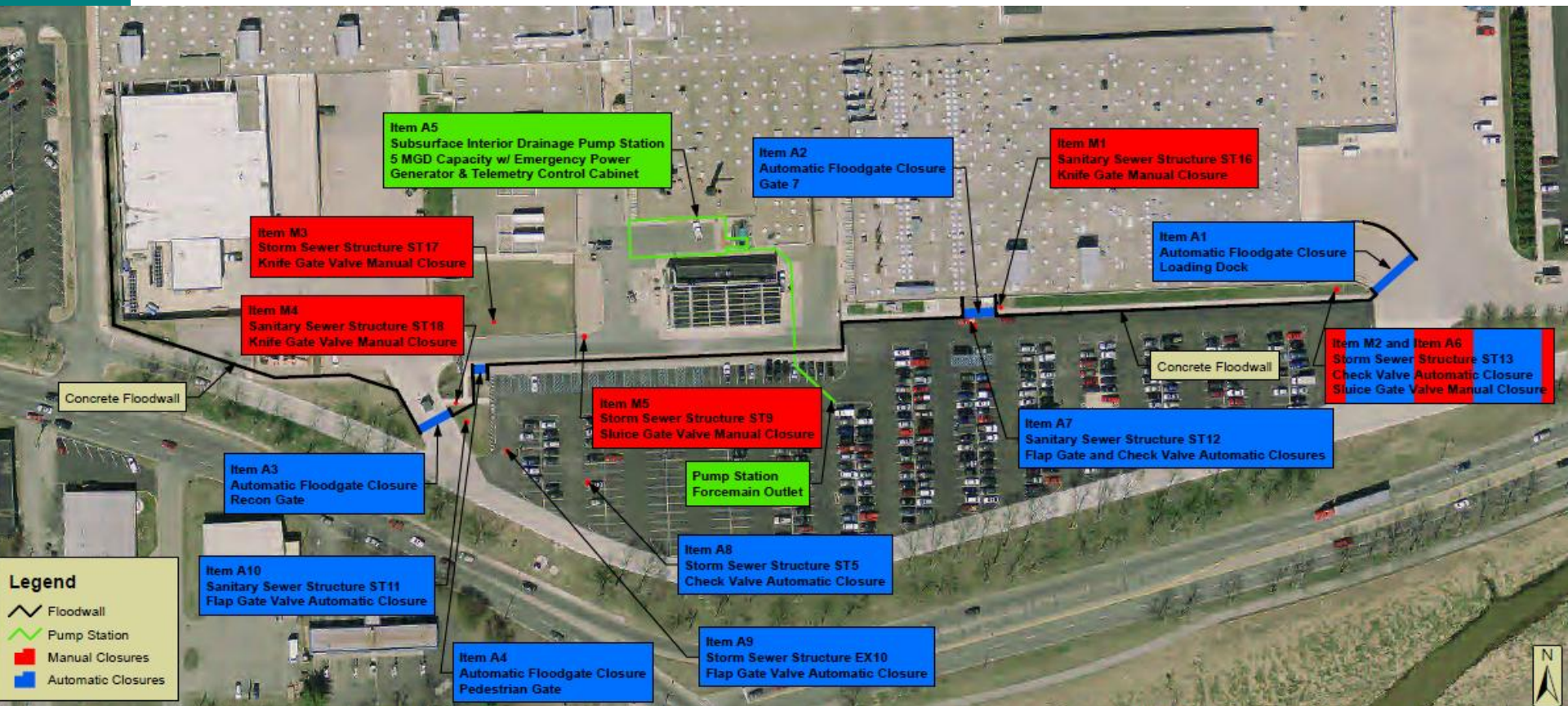
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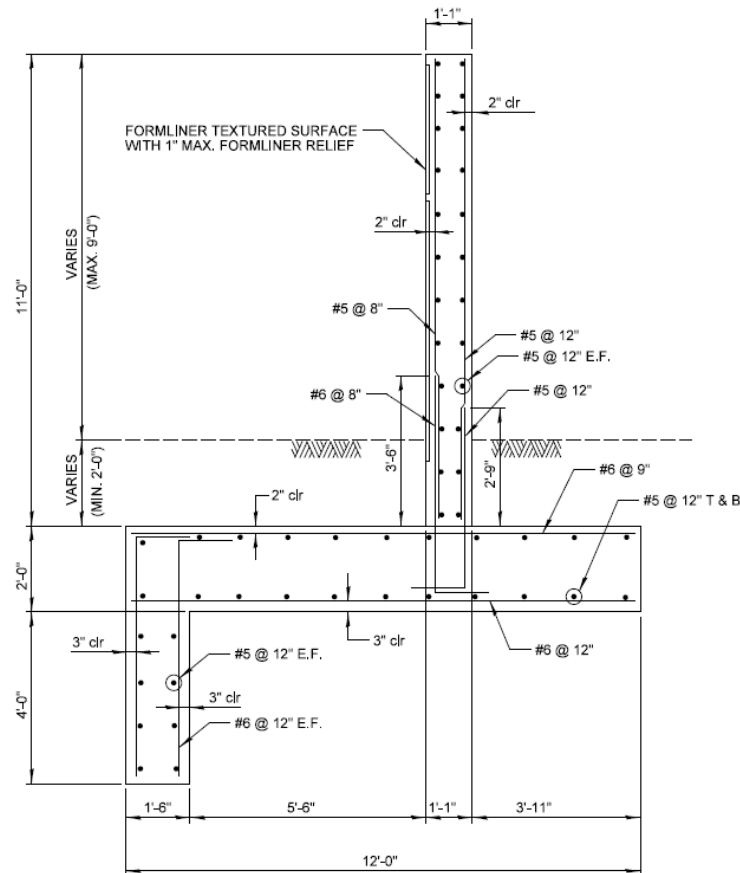
CEP Site Design Overview

- Approx. 1,800 feet of concrete floodwall
- Max wall height of approx. 8 – 9 ft
- 4 automatic closure gates
- Reconfiguration and backflow prevention of storm and sanitary sewers
- 5 MGD pump station for seepage
- Architectural considerations important

CEP Site Design Overview



CEP Site Design Overview



6 SECTION - 9' (ABOVE GRADE)
SCALE: $\frac{1}{2}" = 1'-0"$

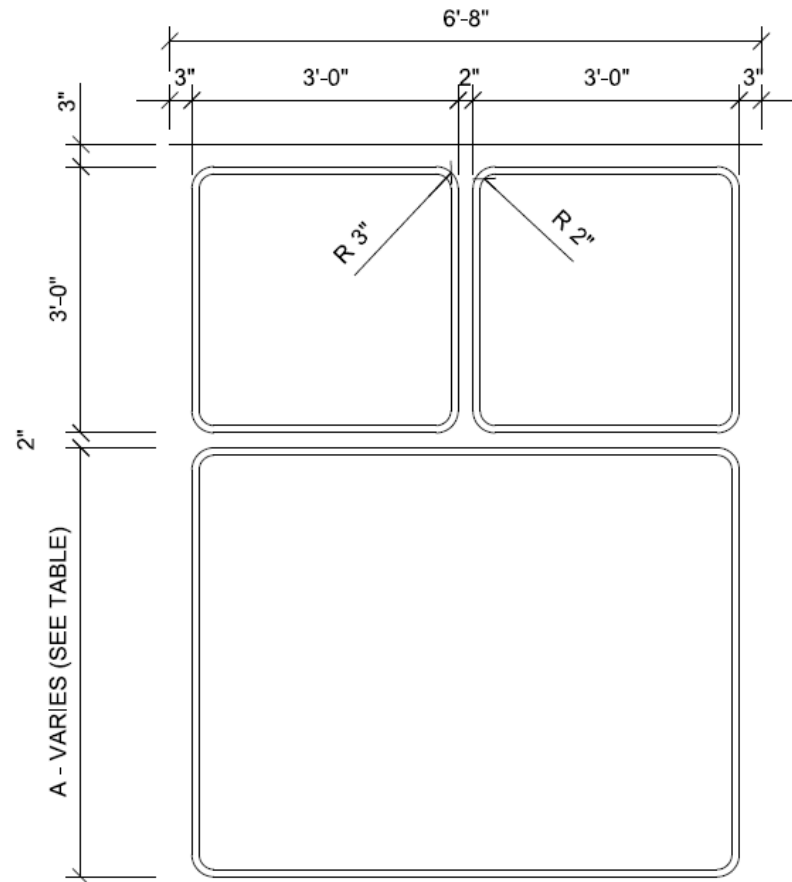




Architectural Context



Architectural Intent









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CTC Site Construction



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CEP Site Construction



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CEP Site Construction



Lessons Learned

- It takes a major flood to make people aware.
- Effective flood mitigation requires a multi-pronged approach
- You can protect critical facilities using NAI approach but...
 - It takes more than minimum modeling
 - It takes creativity
- Don't forget about what is underground
- Flood protection can enhance a site

CEP Site Construction



Acknowledgments

- Phil Henry (CEP) and John Lashbrook (CTC)
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- F.A. Wilhelm Construction (CTC Site)
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- Above All Photography Ltd. (Aerial Photos)